

## APPENDIX E:

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# Conservation Plan For Federally Listed Threatened and Endangered Species



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## Introduction

This Conservation Plan documents the Monongahela National Forest's (MNF) past and present efforts to meet its responsibilities identified in Sections 2(b), 2(c)(1), 7(a)(1), and 7(a)(2) of the Endangered Species Act of 1973, as amended, to carry out programs for the conservation and recovery of endangered and threatened species. Through the biological assessment and biological opinion processes, these actions have been determined to maintain quality habitat over the long term for threatened and endangered species across the entire MNF (USFS 2001, USFWS 2002).

- Section 2(b) states that “The purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for conservation of such endangered species and threatened species...”
- Section 2(c)(1) states, “It is further declared to be the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act.”
- Section 7(a) (1) states that a proactive approach should be taken to conserve endangered species. “All other Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act.”
- Section 7(a) (2) states that Federal agencies shall consult with the U. S. Fish and Wildlife Service (USFWS). “Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical,

unless such an agency is granted an exemption for such action by the committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.”

The MNF is committed to conserving, protecting, and maintaining habitat for federally listed species. This commitment is evident in the 1986 *Forest Land and Resource Management Plan (Forest Plan)*, which placed high priority on management of ecosystems to protect and preserve species, particularly those with special habitats and those federally listed as threatened or endangered (pp. 84 and 230-234).

The ultimate goal of a Conservation Plan is recovery of the species, so there is no longer a need to list it as Endangered or Threatened under criteria found in Section 4(a)(1) of the ESA, as amended. Factors responsible for the listing of a species may occur off the Forest and beyond Forest Service control. However, all actions of the MNF are directed toward maintaining the status of listed species, and whenever possible contributing toward recovery objectives outlined in approved Recovery Plans.

Recovery of any species depends on the collective actions of many agencies, organizations, landowners, and individuals. The MNF benefits listed species by planning management activities that improve degraded habitats and protect species' populations.

All actions in the Conservation Plan are dependent on available funding through annual budgets; however, non-compliance with a mandatory term or condition would trigger the need for further consultation with the USFWS. In the event that a species is recovered and de-listed, some conservation actions may change.

The Conservation Plan is subject to change as new information is obtained, and as *Forest Plan* monitoring occurs. Such changes will be made following consultation with, and assistance of, the USFWS.

## Conservation Plan Activities: General

Nine threatened or endangered species occur on the MNF: bald eagle, Cheat Mountain salamander, Indiana bat, Virginia (VA) big-eared bat, West Virginia (WV) northern flying squirrel<sup>1</sup>, running buffalo clover, shale barren rock cress, small whorled pogonia, and Virginia (VA) spiraea. Data collected over the years indicate MNF *Forest Plan* implementation has maintained or improved these species' habitat and populations (USFS, 2001).

The MNF takes seven measures to protect, manage, and recover these species and to meet their Recovery Plans' objectives:

- **Consultation and Cooperation:** Consult with the USFWS at the programmatic and project levels to insure activities planned and implemented on the MNF meet both the letter and intent of the Endangered Species Act, as amended. MNF personnel work with experts in the USFWS other federal and state agencies, universities, and organizations to formulate objectives and projects that will conserve, protect, and recover populations and habitats of threatened and endangered species on the MNF.
- **Habitat Protection and Improvement and Protection of Individuals:** Develop and implement measures to guide management of the MNF that are soundly based on principles of ecosystem management and work within the capabilities of the land to sustain natural resources, including habitat for and populations of threatened and endangered species. Natural communities in all their successional stages are maintained, from vigorously growing saplings to mature forested stands. Special habitats, which support listed species have been protected and managed to maintain their unique ecological conditions. Riparian corridors have special management guidelines.
- **Monitoring/Inventory/Survey:** Collect or obtain accurate and current information about threatened and endangered species' life history requirements, habitat needs, threats to survival, and population/habitat status on the MNF and across the species' range to insure a solid basis for decision-making.
- **Education and Training:** Provide the public opportunities to learn about and appreciate threatened and endangered species so they will understand the importance of activities designed to conserve, protect, and recover these species and their habitats. Provide training and continuing education to Forest employees to insure the MNF work force has the best scientific information available upon which to base decisions concerning threatened and endangered species on the MNF.
- **Research:** Cooperate with Forest Service Northeast Forest Research Station, other agencies, universities, and organizations to determine information needs and provide opportunities to conduct needed threatened and endangered species research on MNF lands. Incorporate relevant research findings into decision-making processes.
- **Land Acquisition:** It is the Forest's practice to retain MNF lands that contain threatened and endangered species populations, and it is a top priority to acquire private lands that provide habitat for these species, through either exchange or purchase with willing sellers (*Forest Plan*, p. 94). Over 53,000 acres have been acquired by the MNF since 1986. Projects or land use changes proposed for these lands are subject to the scrutiny of the National Environmental Policy Act (NEPA) process, including a Biological assessment/evaluation to determine potential effects on threatened and endangered species. Threatened and endangered species are fully considered in any decisions regarding land use on these properties. High quality habitat is protected from alterations that would degrade threatened and endangered species' habitat.
- **Law Enforcement:** Ensure compliance with all laws, regulations, and policies pertaining to MNF threatened and endangered. Effective law enforcement is vital to the protection and conservation of threatened and endangered species. Law enforcement efforts on the MNF complement recovery objectives for compliance with laws protecting MNF species.

<sup>1</sup> *Glaucomys sabrinus fuscus* has begun to be called the WV northern flying squirrel because the majority of occurrences and preferred habitat is found in WV.

The Monongahela Conservation Plan incorporates several key documents, such as the *Forest Plan Final Environmental Impact Statement* (USFS, 1986a), *Forest Plan* (USFS, 1986b), the *Revised Biological Assessment* (USFS, 2001), and the March 2002 *Biological Opinion* (USFWS, 2002). It also incorporates the recovery plans of all threatened and endangered species of the MNF, which are listed in the literature citation section of this document.

Species-specific recovery plans provide additional guidance to conserve and recover each threatened or endangered species throughout its range. A team of scientists who are considered experts on the species being addressed has developed each recovery plan. A National Forest such as the MNF may encompass all or only a small part of the range of a species, and all recovery objectives may not be applicable. A copy of each recovery plan is available in Ranger District office of the MNF and the Supervisor's Office.

## Conservation Plan of Work: Specific Examples

The following pages identify measures the MNF implements to manage and protect habitat and promote the recovery of threatened and endangered species of the MNF. If the *Forest Plan* were amended as proposed in the *Threatened and Endangered Species Forest Plan Amendment's Environmental Assessment*, appropriate standards from Appendix A would be incorporated into this Conservation Plan.

### BALD EAGLE

<i>Haliaeetus leucocephalus</i>	Threatened
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Since approval of their Recovery Plan, bald eagle populations across the lower 48 States have increased to the point that several Recovery Plan Objectives have been met. In 1995, the bald eagle was down listed from endangered to threatened (Federal Register, July 1995); and in 1999, it was proposed for delisting.

#### **Consultation and Cooperation**

- Consistent with *Forest Plan* standard 1560 (M) (1), management and implementation of this species' Recovery Plan is coordinated with West Virginia Division of Natural Resources (WVDNR), universities, Forest Service research, USFWS, The Nature Conservancy, etc.

#### **Habitat Protection and Improvement and Protection of Individuals**

The MNF has contributed to the recovery of bald eagles in West Virginia (WV) by providing secure winter habitat on the Forest. Forested riparian corridors are retained adjacent to traditional wintering bodies of water (rivers and lakes). Den trees and snags are retained across the Forest along with large blocks of 60+ year old forested stands. Wilderness provides a variety of choices for day and/or night roosting. Quality fish habitat is maintained to provide a consistent prey base.

#### **Nesting and Roost Trees**

- Known nest sites and land within ½-mile radius of the nest site are protected.
- Forested conditions in riparian corridors are maintained.
- Bald eagle habitat is maintained within corridors of candidate Wild and Scenic Rivers.
- Mature forests are maintained throughout the MNF that are, or have potential to become, old growth stands where an abundance of large, over-mature trees exist for nesting or roosting.
- Tree felling is restricted in various Management Prescriptions (MP). Vegetation manipulation is not used to alter the natural environment in MP 5.0 Wildernesses (*Forest Plan*, p. 155). In MP 6.2--the MP in which the only MNF bald eagle site occurs--"Trees may be cut only to aid in

development of dispersed recreation, to enhance public safety, for insect and disease control, or to salvage timber and restore areas severely damaged by hurricanes or ice storms, or other natural phenomena beyond human control” (*Forest Plan*, p. 185). These restrictions reduce the potential for suitable roost or nest trees to be harvested.

- Retention of a variety of den trees and snags throughout the MNF that could be used as roost trees (see snag and cull tree standards throughout the *Forest Plan*).

### **Foraging and Prey Base**

- Protections of aquatic ecosystems across the forest to maintain water quality, retain free-flowing conditions, and sustain fish habitat.
- Riparian areas along streams are maintained, especially those streams 100 feet along both sides of streams that are at least 30 feet wide as of June 15. All standing dead trees are protected in these areas, except for public safety in trailside areas; also, limits are placed on major occupancy developments within these areas (*Forest Plan*, pp. 87-88).
- Phasing out of some grazing allotments from riparian corridors and fencing livestock out of streams and floodplains to reduce release of sediment to streams and promote stream shading. These actions improve habitat for fish, prey of the bald eagle.

### **Monitoring/Inventory/Survey**

- Searches for eagle nests and protection of known sites consistent with page 86 of the *Forest Plan*.
- The MNF collaborates with WVDNR to monitor the nest on the MNF and look for new nests.

### **Education and Training**

- A “Birds of Prey” presentation that includes a discussion of bald eagles is given to schools, civic, business organizations, and other groups to help the public appreciate this species and its habitat needs. A major focus of this effort has been on nontraditional audiences. A significant number of these presentations are conducted in inner-city environments.
- A “West Virginia Eagles” brochure is provided in MNF visitor centers and some offices. It describes the life history of the bald eagle and gives information on how to identify bald eagles.
- MNF web page information and links to WVDNR Wildlife Diversity and Rare, Threatened and Endangered Species sites.

### **Land Acquisition**

- Acquisition of miles of stream corridors that now, or in the future, may serve as eagle habitat.

## **CHEAT MOUNTAIN SALAMANDER**

<i>Plethodon nettingi</i>	Threatened
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Extensive logging of spruce around the turn of the 20<sup>th</sup> century and ensuing wild fires are the most likely cause of decline for this species. Competition from similar plethodontids, genetic isolation of populations, habitat degradation (e.g., acid deposition), habitat fragmentation, and habitat disturbance all continue to contribute to the limited occurrence of the this species (Pauley, 1980; USFWS, 1991).

### **Consultation and Cooperation**

- Consistent with *Forest Plan* standard 1560 (M) (1), implementation of this species’ Recovery Plan is coordinated with WVDNR, universities, Forest Service research, USFWS, The Nature Conservancy, etc. The MNF also routinely seeks expertise from Dr. Thomas K. Pauley of Marshall

University, the leading authority on the life history and range distribution of this species.

## **Habitat Protection and Improvement and Protection of Individuals**

### **Preservation of Known Populations**

- All known populations of Cheat Mountain salamander are preserved via Forest-wide standards - both general standards applicable to all threatened and endangered species and specific Cheat Mountain salamander standards (*Forest Plan*, pp.84-87 and K-17). It has been the MNF's practice to protect this species by preserving a 300-foot buffer around each colony, per Dr. Pauley's recommendation.

### **Protection of Suitable Habitat**

- An area that meets the criteria for suitable habitat for Cheat Mountain salamander is either avoided (assumed occupied) or field surveyed to determine if the area is occupied (*Forest Plan*, p. 86).
- MP standards place limits on timber harvesting and encourage the retention of habitat desirable to Cheat Mountain salamanders (e.g. red spruce, shaded, or moist coves with rhododendron and/or small emergent rocks within spruce or hemlock forest at high elevations).
- Potentially suitable habitat for this species that coincides with WV northern flying squirrel habitat is also managed via the squirrel's Zoological Area protective standards (*Forest Plan*, pp. 234).
- Mature forests and old growth stands are maintained throughout the range of this species on the MNF to provide an abundance of large, over-mature trees exist will provide additional habitat (large woody debris, closed canopies, humid microclimates) for this species.

### **Development of Suitable Habitat**

- About 79,000 acres (~9% of the MNF) of Wilderness is protected, some of which are, or could become suitable for Cheat Mountain salamander colonization.
- About 14% of the MNF is in MP 6.2, where this species' potentially suitable habitat is protected by a standard that restricts tree cutting to only those circumstances that would "aid in development of dispersed recreation, to enhance public safety, for insect and disease control or to salvage timber and restore areas severely damaged by hurricanes or ice storms" (*Forest Plan*, p. 185).
- MPs such as MP 6.1 provide standards that would have five percent of the MNF be maintained in old growth stands, which--given the right location, elevation, and microclimate conditions--could support or allow the colonization of Cheat Mountain salamanders.

## **Monitoring/Inventory/Survey**

- Known populations and potential habitat of Cheat Mountain salamander on the MNF have been delineated on USGS topographic maps by Dr. Thomas K. Pauley of Marshall University, the leading authority on the life history and range distribution of the Cheat Mountain salamander.
- Several known populations (Timberline) are monitored to establish long term population trends.

## **Education and Training**

- The MNF presents programs to schools, civic, and business organizations, and other groups to help the public appreciate this species and its habitat needs.
- MNF personnel have been given on-job training in identifying and surveying methods.

## **Research**

- The MNF cooperates with Marshall University (Dr. Pauley) to assess life history requirements, habitat distribution, and long term monitoring of effects of timber harvest or special uses.

## **Land Acquisition**

- Known and suitable habitat has been purchased since 1986 (e.g. 40,000 Mower Tract purchase).

## INDIANA BAT

<i>Myotis sodalis</i>	Endangered
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Hibernacula monitoring shows Indiana bat populations are decreasing in portions of their core range (USFWS, 1996). Populations in WV have been increasing since the early 1980's. WV has seen a 45% increase in the number of hibernating Indiana bat (Wallace pers. comm., 1999). Total Indiana bats in WV is approximately 10,658. This represents 3% of the entire hibernating Indiana bat population range-wide.

### **Consultation and Cooperation**

- Consistent with *Forest Plan* standard 1560 (M)(1), management and implementation for Indiana bat recovery is coordinated with WVDNR, universities, Forest Service research, USFWS, The Nature Conservancy, etc..

### **Habitat Protection and Improvement and Protection of Individuals**

#### **Zoological Area Designation**

The existing *Forest Plan* specifically protects Indiana bat hibernacula, maternity colonies, and a corridor to foraging areas via Zoological Area designation (*Forest Plan*, p. 230). Under this designation, Indiana bat hibernacula, all lands within a 200-foot radius of the hibernacula (~30 acres), and a forested corridor 300 feet wide between hibernacula and foraging areas are managed specifically to benefit endangered bats. (Note: no maternity colonies have been found on the MNF to date. If they are found, the *Forest Plan* requires that all lands within a 200-foot radius be protected around the maternity site (*Forest Plan*, pp. 230-234). The following Zoological Area standards are implemented to protect, manage, and aid in the recovery of this species:

- Pesticide use is avoided.
- The construction of new recreational facilities is prohibited.
- Vegetation treatments are avoided or coordinated with Indiana bat habitat requirements.
- An unbroken forest canopy is maintained to provide travel corridors between the species hibernacula and foraging areas.
- Significant hibernacula entrances are signed and gated against entry. Their locations are not published for distribution to the public nor are directional signs posted on roads or trails to direct people to them.
- Entry into caves is restricted. Public entrance into caves used as hibernacula for this species is prohibited from September 1 to May 15.
- Entry during the closed periods may be permitted for scientific study and observation if written approval is obtained from the Forest Supervisor and a permit is obtained from the USFWS.
- Gates installed at cave and abandoned mine entrances where Indiana bat habitat exists are designed to allow free entry and exist by bats and not restrict airflow.
- Gates are maintained on a schedule based on past history of problems.
- Forest fires are given high priority for control to prevent bat asphyxiation or significant changes in vegetation cover.
- Special uses that are adverse to the species are prohibited within the travel corridor from their hibernacula to their foraging areas.
- Surface occupancy of mineral operations on US minerals is prohibited near Indiana bat hibernacula. When minerals are privately owned, consultation with the USFWS is undertaken to minimize adverse effects on habitat.

- High priority is given to acquiring caves inside the proclamation boundary that are used by this species.
- Restrictions are placed on dynamiting during maternity or hibernation periods that could create a severe stress on bats.
- Placement of new utilities or roads is discouraged.

### **Management Prescription Designation**

Lands used by Indiana bats, such as key areas (areas adjacent to or near hibernacula that contain, or have the potential to become, mature stands and serve as roosting and foraging habitat) and primary range (stands within a five-mile radii of hibernacula that serve as foraging and swarming habitat) are protected via Forest-wide standards and various MP standards. Individual MPs provide protection for key areas and primary range in the following ways:

- About 1,000 acres of Indiana bat habitat is located within MP 2.0. MP 2.0 (~2% of the MNF) seeks to sustain dispersed habitat elements by creating or maintaining 5% openings, 5-49% conifers, 3-5 cull trees per acre, and delaying harvest until most tree species reach 22-28 inches diameter at breast height (dbh) (*Forest Plan*, p. 117 and 120). Uneven aged management is the primary silvicultural system used (*Forest Plan*, p. 121).
- Approximately 48,000 acres of Indiana bat habitat is currently managed via MP 3.0 standards. MP 3 (~20% of Forest) strives to maintain vegetative diversity by creating or maintaining 5% of an area in openings, 5% old growth, 5-49% conifer, 3-5 snags and culls per acre, seedling stands 10-25%, pole stands 15-38%, and saw timber 38-75% (*Forest Plan*, p. 129). This MP would not have timber harvested until trees reach certain size classes (22-28" dbh for most species) (*Forest Plan*, p. 133). When a balanced age class distribution is achieved, trees of most species would not be harvested until they were over 70 years old (*Forest Plan*, p. 132).
- Around 22,000 acres of Indiana bat habitat can be found in MP 5.0 Wilderness. MP 5 (~9% of Forest) does not permit active vegetation management. It relies on natural forces to create or maintain key areas and primary range of Indiana bats.
- MP 6.1 (~47% of Forest) contains ~142,000 acres of Indiana bat habitat. This MP strives to maintain 5% openings, 5% old growth, and 5-25% conifer in an area (*Forest Plan*, p. 166). It requires that all snags be retained, except those that are a public safety hazard or visual quality concern (*Forest Plan*, p. 167). Cull trees are protected in MP 6.1 areas; at least five culls per acre are retained in thinning units. Culls may be girdled to produce snags in certain instances, and they are protected from firewood collection (*Forest Plan*, p. 168). Once a balanced age class distribution is achieved, black cherry is not to be harvested until its 120 years old; oak-hickory and mixed hardwood until 200 years, and conifers 80-100 years (*Forest Plan*, p. 172). Frequency of entry is restricted to one major project (or equivalent) per 1500-acre area every ten years, minor projects can occur at any time (*Forest Plan*, p. 173). Regeneration cutting is limited to 8% or less per entry in a 10-year period (*Forest Plan*, p. 174).
- About 29,000 acres of Indiana bat habitat exists in MP 6.2. MP 6.2 (~14% of MNF) restricts the amount of tree cutting that can occur in an area. Trees can be cut only for the management of threatened and endangered species (like the Indiana bat), to aid in development of dispersed recreation, to enhance public safety, for insect and disease control, or to salvage timber and restore areas severely damaged by hurricanes or ice storm (*Forest Plan*, pp. 185 and 189a).

### **Additional Forest protections**

The following are additional MNF actions that have contributed to habitat protection and management for this species since the *Forest Plan* began to be implemented in 1986.

### **Hibernacula**

- Most significant caves are gated or fenced, which has protected Indiana bat populations and likely has been responsible for their increases (Wallace, 1999). Several gates have been modernized to provide more secure and/or bat friendlier gates through cost share agreements and volunteer efforts.
- Caves are protected from damage resulting from surface activities (*Forest Plan*, p. 67).
- Public entry into caves may be prohibited or restricted to protect significant habitat for threatened and endangered or unique wildlife species that are sensitive to disturbance by humans (*Forest Plan*, p. 67). Hibernacula have been gated and closed either seasonally or year round to prevent human disturbance. Some Indiana bat hibernacula that are closed year round also serve as maternity sites for VA big-eared bats in the summer.
- Numbers of bats using known hibernacula are monitored regularly in cooperation with WVDNR. Human activities that may affect hibernacula are also monitored and appraised regularly.
- The MNF completed the process of designating caves used by endangered bats as significant providing for their protection/management under the Federal Cave Resources Protection Act.

### **Foraging Habitat**

- Forest-wide riparian standards guide management of foraging habitat (*Forest Plan*, p. 86-87a).
- Major occupancy developments in riparian areas are discouraged (*Forest Plan*, p. 88).
- Extensive use of pesticides in foraging habitat is avoided (*Forest Plan*, p. 88). Pesticide use is closely scrutinized in all areas to avoid impacts to Indiana bat and maximize maintenance of habitats. (Major defoliation by gypsy moth may have long-term negative ramifications on important foraging areas if left untreated.)
- Across the MNF, mature stands have been thinned, creating and/or maintaining canopy closures that enhance foraging habitat for Indiana bats. Annually, thinning occurs at an average rate of ~ 3,000 acres on the MNF.
- Normally, the Forest restricts the size of clearcuts, seed tree cuts, or shelterwood removal cuts to a maximum of 25 acres. Openings are spaced 1/8 mile apart and separated by manageable stands of trees (opening defined as cutover area within which the vegetation is less than 20% of the height of the surrounding vegetation (*Forest Plan*, p. 77).
- Vegetative manipulations, such as patch clear cuts (five acres or less), may be accomplished in riparian areas to perpetuate or establish desirable tree species or composition (*Forest Plan*, p. 88).

### **Roost Trees and Maternity Sites**

- Standing dead trees on the MNF are protected via a Forest-wide standard. Standing dead trees usually may only be cut if they pose a safety hazard or exist along trails; dead and down trees may be removed (*Forest Plan*, p. 87a). This protection ensures that a variety of den trees and snags are available for roost trees or potential maternity sites.
- Living loose bark trees such as hickories, elms, oaks, and sycamores are protected via a Forest-wide standard (*Forest Plan*, p. 87a).
- Hollow trees and den trees, whether living or dead, are protected (*Forest Plan*, p. 87a).
- About 30% of the MNF have been placed in designations in which forest cover is subject primarily to natural disturbances (i.e. MP 5.0 Wildernesses; MP 6.2 areas of non-motorized recreation; some MP 8.0 special areas, etc.). These areas provide abundant suitable roost trees and potential maternity sites now and into the future, although their canopy closure may not be optimal for Indiana bat foraging habitat.
- Mature habitat/old growth is maintained throughout the MNF, even in those MPs that allow timber

management. Such stands contains large, over-mature trees that are abundantly available as suitable roost trees and potential maternity sites.

- Bat houses have been constructed and placed on the MNF.

### **Water sources**

- Waterholes for wildlife and other forest uses have been constructed and maintained on National Forest lands that are used regularly by forest bats.
- Springs and seeps are recognized as special habitats and projects are designed to protect their unique characteristics (see Forest-wide and MP standards for seeps).

### **Monitoring/Inventory/Survey**

- The Forest Service has completed, through an agreement with Bat Conservation International (BCI), a Conservation Assessment for eastern forest bats, including the Indiana bat.
- Representatives of the MNF frequently participate in meetings and conferences of the NE bat working group to coordinate conservation of eastern forest bats.
- Indiana bat population surveys are done in cooperation with WVDNR to track the status of this species (USFS, 2000).
- THE MNF has an ongoing program of mist netting and telemetry work to gather information about habitat use by bats on MNF, focusing on Indiana bats.
- Temperature and humidity data-loggers have been placed within and outside Indiana bat caves to provide information on cave microclimate and suitability for Indiana bat hibernation.
- Inventory of MNF caves has verified occupation by Indiana bats and identified additional hibernacula. Entrances for hibernacula have been accurately mapped using Global Positioning Systems (GPS).
- Habitat for Indiana bat on the MNF has been, and continues to be assessed and modeled (DeMeo 1998) using Geographic Information Systems (GIS). This effort has resulted in management recommendations that have been implemented and used to develop management strategies for identified areas of influence.

### **Education and Training**

- MNF personnel have been trained in habitat requirements, identification, and surveying methods.
- A “Bats of West Virginia” brochure is available at MNF visitor centers and some offices. This brochure educates the public about the existence, habitat use, reproduction, and benefits of WV bats, including the Indiana bat.
- MNF personnel have conducted school presentations on eastern woodland bats.
- MNF web page information and links to WVDNR Wildlife Diversity and Rare, Threatened and Endangered Species Sites.

### **Research**

- The Forest, through Cost Share Agreements, has participated in several research efforts to better define Indiana bat habits and habitats. Examples of these efforts are studies to determine local Anabat signatures for Indiana bat and other eastern forest bat species conducted by Frostburg State University; summer Indiana bat surveys and habitat identification conducted by WVDNR; Gypsy moth control studies related to the *Temporal and Spatial Relationships of Non-target Insects in Gypsy Moth Susceptible Forests* conducted by the Carnegie Museum of Natural History; and on-going research by the Northeast Research Station on Fernow Experimental Forest to identify

preferred roosting habitat. The Forest continues to maintain close working relationships with these partners, the USFWS, and others to fill identified knowledge gaps for this species.

### **Land Acquisition**

Priority is given to acquire lands or rights needed to protect or aid in the recovery of this species (*Forest Plan*, p. 94). Examples where the Forest has acquired lands for this purpose include:

- Acquisition of stream corridors that now, or in the future, may serve as Indiana bat habitat.
- Acquisition of lands in 1993 (US Tract 956) adjacent to a known Indiana bat hibernaculum that represent “key areas” of Indiana bat habitat for this site.
- Acquisition of lands in 1985 (US Tract 1403a) that contain nearly all of the Cave Hollow Arbogast System, a known Indiana bat hibernacula and “Critical Habitat” for VA big-eared bat.

### **Law Enforcement**

- Closing bat caves to public use and periodic monitoring by biologists, law enforcement, and other FS personnel has reduced or eliminated human visitation in MNF caves during the time they are occupied, which is beneficial to this bat.

## **VIRGINIA BIG-EARED BAT**

<i>Corynorhinus townsendii virginianus</i>	Endangered
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This bat is a geographically isolated and sporadically distributed cave obligate species. WV holds its largest populations, particularly Pendleton County (USFS, 2001). WV’s Cave Mountain Cave, Hellhole, Hoffman School Cave, Sinnit Cave, and Cave Hollow/Arbogast Cave are designated as "Critical Habitat" for this species based on the precise physical structure, temperature, and humidity conditions required for its continued survival, as well as the significant number of VA big-eared bats that occur there. Cave Mountain and Cave Hollow/Arbogast are on the MNF.

### **Consultation and Cooperation**

- Consistent with *Forest Plan* standard 1560 (M) (1), management and implementation of this species’ Recovery Plan is coordinated with WVDNR, universities, Forest Service research, USFWS, The Nature Conservancy, etc.

### **Habitat Protection and Improvement and Protection of Individuals**

#### **Zoological Area Designation**

- The *Forest Plan* protects portions of VA big-eared bat habitat via Zoological Area designation. Under this designation, hibernacula, maternity caves, all lands within a 200-foot radius of VA big-eared bat caves, and a forested corridor of 300 feet between hibernacula and foraging areas are managed specifically to benefit these endangered bats (*Forest Plan*, pp. 230-234). Lands designated as Zoological Areas are protected by the same standards previously identified for Indiana bats. In many cases, VA big-eared bat areas overlap with Indiana bat areas (approximately 25 of 40 acres overlap).

#### **MP Designation**

- Forest-wide standards, riparian standards, and specific MP standards protect lands not within the Zoological Areas of VA big-eared bats. Individual MPs that provide protection for VA big-eared bats and their habitat are the same as those described for Indiana bats earlier in this document.

### **Additional Forest protections**

The following are other actions that have contributed to protection and management of this bat.

#### **Hibernacula**

- Caves are protected from damage resulting from surface activities (*Forest Plan*, p. 67).
- Public entry into caves may be prohibited or restricted to protect significant habitat for this species because it is sensitive to disturbance by humans (*Forest Plan*, p. 67). Depending on whether they serve as hibernacula in the winter and/or summer maternity sites, caves used by VA big-eared bat have been gated and closed seasonally or year round to prevent human disturbance.
- Several gates have been modernized to provide more secure and/or bat friendlier gates through cost share agreements and volunteer efforts.
- Numbers of bats using known hibernacula and maternity sites are monitored regularly in cooperation with WVDNR. Human activities that may affect hibernacula or maternity sites are also monitored and appraised regularly.
- The MNF completed the process of designating caves used by endangered bats as significant providing for their protection/management under the Federal Cave Resources Protection Act.

#### **Foraging**

- MNF range allotments and wildlife openings provide foraging habitat for the VA big-eared bat.

### **Monitoring/Inventory/Survey**

- Inventory of MNF caves has verified occupation by VA big-eared bats and resulted in recommendations for management that have been implemented.
- Temperature and humidity data-loggers have been placed within and outside VA big-eared bat caves to provide information on cave microclimate and suitability for VA big-eared bat hibernation and maternity use.
- The Forest Service has entered into an agreement with BCI to complete a Conservation Assessment for eastern forest bats, including the VA big-eared bat.
- Representatives of the MNF frequently participate in meetings and conferences of the NE bat working group to coordinate conservation of eastern forest bats.
- VA big-eared bat population surveys are done in cooperation with WVDNR to track the status of this species. WVDNR monitors eleven WV caves for summer VA big-eared bat use; three of the 11 are on MNF land. To minimize current disturbance problems, winter hibernacula counts are conducted biennially instead of annually (see USFS, 2000).
- THE MNF has an ongoing program of mist netting and telemetry work to gather information about habitat use by bats on the MNF.
- Inventory of MNF caves has verified occupation by VA big-eared bat and identified additional hibernacula. Entrances for hibernacula have been accurately mapped using Global Positioning Systems (GPS).

### **Education and Training**

- MNF personnel have been trained in bat habitat requirements/identification/surveying methods.
- A “Bats of West Virginia” brochure is available at MNF visitor centers and offices. It educates the public about the existence, habitat use, reproduction, and benefits of VA big-eared bat.
- MNF web page information and links to WVDNR Wildlife Diversity and Rare, Threatened and Endangered Species Sites.

## **Research**

- The Forest, through Cost Share Agreements, has participated in several research efforts to define VA big-eared bat habits and habitats. Examples of these efforts are studies to determine local Anabat signatures for VA big-eared bat and other eastern forest bat species conducted by Frostburg State University; the foraging habits and habitats of the VA big-eared bat conducted by WV DNR; and Gypsy moth control studies related to the *Temporal and Spatial Relationships of Non-target Insects in Gypsy Moth Susceptible Forests* conducted by the Carnegie Museum of Natural History. The Forest continues to maintain close working relationships with these partners, the USFWS, and others to fill identified knowledge gaps for this species.

## **Land Acquisition**

Priority is given to acquire lands or rights needed to protect or help recover this species (*Forest Plan*, p. 94). Examples where the Forest has acquired lands for this purpose include:

- Acquisition of stream corridors that now, or in the future, may serve as VA big-eared bat habitat.
- Lands adjacent to a known VA big-eared bat hibernaculum and maternity sites were acquired in 1993 (US Tract 956).
- Lands were acquired in 1985 (US Tract 1403a) that contains nearly the entire Cave Hollow Arbogast System, Cave Hollow/Arbogast is designated “Critical Habitat” for VA big-eared bat.

## **Law Enforcement**

- Closing bat caves to public use and periodic monitoring by biologists, law enforcement, and other FS personnel has reduced or eliminated human visitation in MNF caves during the time they are occupied, which is beneficial to this bat.

## **WV NORTHERN FLYING SQUIRREL**

<i>Glaucomys sabrinus fuscus</i>	Endangered
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WV northern flying squirrels are usually found in moist northern hardwood forests above 2860 feet elevation, which usually contain widely spaced, mature trees, abundant standing, and downed snags (USFWS 1990b, WVDNR, 1997), and some conifer (spruce, hemlock, fir)(Stihler, 1994). The MNF contains greater than 90% of the known habitat within the squirrel’s range. As of 2001, over 1,000 WV northern flying squirrels have been captured, including a small number of recaptures.

## **Consultation and Cooperation**

- Consistent with *Forest Plan* standard 1560 (M) (1), management and implementation of this species’ Recovery Plan is coordinated with WVDNR, universities, Forest Service research, USFWS, The Nature Conservancy, etc. Also, the Forest wildlife biologist participates as an adjunct team member on the Northern Flying Squirrel Recovery Team.

## **Habitat Protection and Improvement and Protection of Individuals**

The existing *Forest Plan* provides protection for “occupied” habitat of the WV northern flying squirrel consistent with the 1990 *Appalachian Northern Flying Squirrels (Glaucomys sabrinus fuscus, Glaucomys sabrinus coloratus) Recovery Plan* (USFWS, 1990b). In 2001, the USFWS developed new habitat identification and management guidelines for the WV northern flying squirrel and incorporated them into Appendix A of the squirrel’s Recovery Plan so that “suitable,” rather than “occupied,” habitat would be protected.

### **Protection and Management of Occupied Habitat**

- All lands within ½ mile of where a WV northern flying squirrel has been captured are protected via Zoological Area Opportunity Area 832 designation. Because “occupied habitat” is based solely on the proximity to a capture site for WV northern flying squirrels, this ½ mile radius has incorporated and protected habitat that is both suitable and unsuitable (i.e. areas that would not support WV northern flying squirrels because few or none of the habitat elements required by the species were present) (USFWS 2001). To date, ~59,000 acres of WV northern flying squirrel occupied habitat is protected and managed via Forest-wide, MP 8.0, and Zoological Area standards and interim guidelines in Appendix X.
- If all potentially suitable habitat (as defined in Appendix X) were proven occupied via continued and intensive survey efforts, >100,000 acres could be protected under OA 832 designation.
- WV northern flying squirrel suitable habitat also is protected via Forest-wide and other MP standards (e.g. MP 5.0 and MP 6.2), but only Forest-wide threatened and endangered species standards and Zoological Area standards specify measures for managing this species’ habitat.

### **Protection or Development of Suitable Habitat**

- The WV northern flying squirrel is recognized as a species associated with management indicator species of MP 2.0, 3.0, 4.0, 5.0, and 6.1, and as such can benefit from management in any of these areas (see Appendix L-2 of the *Forest Plan* for a list of associated species).
- Wildernesses (~ 9% of the MNF) and MP 6.2 areas (~14%) limit the implementation of activities that could adversely affect suitable WV northern flying squirrel habitat.
- The Forest has thinned northern hardwood stands to release spruce understory and increase the size of the spruce component for WV northern flying squirrel.

### **Monitoring/Inventory/Survey**

- Thousands of WV northern flying squirrel nest boxes have been placed and monitored on the MNF.
- Live trapping surveys have been conducted to identify occupied habitat on the MNF.
- Inventories have been conducted in wilderness and 6.2 areas to determine this species’ occupancy.
- Inventories have been conducted in habitat considered “unsuitable” for this species to test the definition of “suitable” habitat.
- Through Cost Share Agreements, the MNF has participated with WV University in monitoring nest boxes to determine long-term population trends.

### **Education and Training**

- Personnel have been trained to identify and survey for this species.
- Forest personnel have cooperated with the Northeast Research Station in the development of posters/presentations for several conferences.

### **Research**

- Studies on Fernow are currently being conducted to identify life history requirements, home range size within differing habitats, nesting and other habitat components at the landscape level.
- Habitat models have been developed.

### **Land Acquisition**

- Suitable habitat for this species has been purchased since 1986, such as the 40,000 Mower Tract purchase, many acres of which provide occupied and suitable habitat for this species and the Cheat Mountain salamander.

## RUNNING BUFFALO CLOVER

<i>Trifolium stoloniferum</i>	Endangered
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Running buffalo clover has a high affinity for calcium-rich soil, which is abundant throughout the MNF, especially where Greenbrier limestone reaches to the surface. Prior to its listing, running buffalo clover was known at only two WV sites. Today, running buffalo clover is known on 11 MNF sites, with approximately 107,000 individuals. These populations contribute significantly to the viability of this species. No designated critical habitat exists on the MNF for running buffalo clover (USFWS, 1989).

### **Consultation and Cooperation**

- Management and implementation of this species' Recovery Plan is coordinated with WVDNR, universities, Forest Service research, USFWS, The Nature Conservancy, etc. For example, the MNF cooperates with the Northeast Research Station to conduct running buffalo clover research.

### **Habitat Protection and Improvement and Protection of Individuals**

Existing populations occur in floodplain forests, field edges (Bartgis, 1985), old skid roads and ungravelled truck roads, cemeteries, open woodlands, mowed parks, jeep trails, and hawthorn thickets (Cusick, 1989). It prefers semi-shaded woods and depends upon slight levels of disturbance for survival. Natural populations do not occur in areas of full sun (Ostlie, 1990). Evidence indicates this species responds favorably to low levels of disturbance that occurs during road construction, use, and abandonment; terrace farming; and 4-wheel vehicle disturbance (Concannon, 1997).

### **Protection of Occupied Habitat**

- Known populations, including an appropriate buffer around each population are avoided.

### **Protection, Development, and Management of Suitable Habitat**

- Populations have been fenced to prevent adverse disturbance (e.g. regular vehicle traffic).

### **Monitoring/Inventory/Survey**

- About 120,000 acres have been analyzed and/or surveyed for this species in the past 10 years. All project areas that have potential habitat are surveyed before a project is implemented. Surveys are likely to identify additional populations and provide more information about this species.
- MNF or WVDNR personnel monitor known populations on the MNF for health and vigor.

### **Education and Training**

- The MNF has produced a book with color photos of threatened and endangered plant species on the MNF. This book was provided to Forest Staff for reference.
- Personnel have been trained to identify and survey for this species.
- District biotechs have been educated during running buffalo clover work on John's Run.

### **Research**

- The MNF provides opportunities (in cooperation with the WVDNR) for university students to conduct research when requests are received.
- Research studies have been initiated on the Fernow Experimental Forest to fill knowledge gaps about the levels of disturbance beneficial to running buffalo clover. Applied management such as thinning of stands, prescribed fire, or other activities in the proximity of running buffalo clover populations to allow moderate sunlight to reach the ground and create habitat suitable for the colonization of this species are proposed to be evaluated by means of test plots on the MNF.

- The MNF participated with the USFWS and WVDNR on a research project in 1996 on the impacts of timber management (thinning) on this species. It is monitored annually.

### **Law Enforcement**

- The MNF went to court to protect the John's Run population, but lost the case. With this exception, we have not had the need to use law enforcement to protect threatened and endangered plants on the Forest, but we have officers available to do so if needed.

## **SHALE BARREN ROCK CRESS**

<i>Arabis serotina</i>	Threatened
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Nine shale barren rock crest sites are known on the MNF. No shale barren rock crest has been found since the 1989 endangered listing. Potential and known habitat within the entire MNF is estimated to be less than 100 acres. No designated critical habitat for shale barren rock crest exists on the MNF.

### **Consultation and Cooperation**

- Consistent with *Forest Plan* standard 1560 (M) (1), management and implementation of this species' Recovery Plan is coordinated with WVDNR, universities, Forest Service research, USFWS, The Nature Conservancy, etc. One example is the cooperation and participation between the MNF and WVDNR in a Conservation Assessment of the MNF's shale barrens communities.

### **Habitat Protection and Improvement and Protection of Individuals**

Mid-Appalachian shale barrens generally are characterized by open (<10% canopy closure), scrubby pine, oak, red cedar, and woody species growing on dry, south facing steeply sloping (>20%) shale formations. Open herbaceous cover adapted to this harsh environment also can occur (USFWS, 1991a). Often the slope is undercut by a stream directly below the shale barren. Shale barrens are south- to southwest-facing, narrowly endemic sites on shale ridge balds. They exist on Devonian-age shales of the Brallier formation between 1300-2500 ft (396-762 m) elevations (Keener, 1983).

### **Protection of Occupied Habitat**

- Known populations, including an appropriate buffer around each population, are avoided.

### **Protection or Development of Suitable Habitat**

- Potential project areas are surveyed for this species' habitat and adverse effects are avoided.
- Shale barrens and an appropriate buffer around each barren are protected via Forest-wide and Appendix K standards D1(c) (16) and D2b (7) (*Forest Plan*, p. 87 and Appendix K-15 and K-17).
- Most Forest authorized activities (other than activities such as research/information gathering) are prohibited within shale barrens (*Forest Plan*, p. 87).
- Road construction/reconstruction near shale barren areas is limited.
- No active management is implemented at this time for this species. If inventory results indicate that populations are declining and need some type of active management, then the USFWS, WVDNR, and current research would be consulted on appropriate measures to take.

### **Monitoring/Inventory/Survey**

- Consistent with *Forest Plan* standard 2670 (h), surveys for shale barren rock cress are conducted prior to conducting any activity on National Forest System land within Greenbrier County, WV. Such surveys have provided additional information on this species.
- About 1000 acres have been surveyed for shale barrens using specific geology and aerial photos.

- MNF and WVDNR cooperate annually to monitor known populations for health and vigor.

### **Education and Training**

- The MNF has produced a book with color photos of threatened and endangered plant species on the MNF. This book was provided as reference material to appropriate Forest Staff.
- Forest staff is involved in forest management issues relating to threatened and endangered plants.
- Personnel have been trained to identify and survey for this species. In addition, temporary, summer seasonal botany field crews are trained and involved in annual inventory.

### **Research**

- The MNF provides opportunities (in cooperation with the WVDNR) for university students to conduct research when requests are received.

### **Land Acquisition**

- The MNF looks for opportunities to purchase land that will protect this species.

## **SMALL-WHORLED POGONIA**

<i>Isotria medeoloides</i>	Threatened
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The Recovery Plan for the small-whorled pogonia was signed in 1992 (USFWS 1992(a)), but this species was not found on the MNF until the fall of 1997. The local flora is described as dry woodland type, but the relative humidity is higher than the surrounding landscape due to high temperatures and moisture from adjacent ephemeral streams. These local microclimatic conditions control small-whorled pogonia habitability. No designated critical habitat exists on the MNF.

### **Consultation and Cooperation**

- Management and implementation of this species' Recovery Plan is coordinated with WVDNR, universities, Forest Service research, USFWS, The Nature Conservancy, etc. One example is the MNF's participation with WVDNR in annual monitoring of the small-whorled pogonia.

### **Habitat Protection and Improvement and Protection of Individuals**

#### **Protection and Management of Occupied Habitat**

- Known populations, including an appropriate buffer around each population, are avoided.
- Forest-wide threatened and endangered species' standards protect small whorled pogonia (*Forest Plan*, pp. 52 and 84). As part of this protection, it has been the Forest's practice to evaluate potential projects for small whorled pogonia habitat and conduct surveys before any project is implemented. Projects are redesigned or dropped if this species is found in a project area.
- Item D1(c)(16) of Appendix K, *Guidance for processing mineral authorization documents and approving plans for mineral activities on lands on the MNF* provides protection: "Threatened or endangered, and sensitive flora and fauna and their habitat will be protected. See *Forest Plan* forest-wide standards and guidelines 2670, special zoological area standards...and any recovery plans for threatened and endangered species" (*Forest Plan*, p. K-15).

#### **Protection, Management, or Development of Suitable Habitat**

- Potential project areas are surveyed for this species' habitat and adverse effects are avoided.
- No active management is implemented within known populations of this species. If inventory results indicate that populations are declining and need some type of active management, then the

USFWS, WVDNR, and current research would be consulted on appropriate measures to take.

- Prescribed understory fire for oak regeneration could be used in the future to increase habitat suitability for this species.

### **Monitoring/Inventory/Survey**

- The MNF participates with WVDNR in annual monitoring of this species. The one small whorled pogonia site on the MNF is surveyed annually. It has not been found in the last few years.
- About 5000 MNF acres of white pine, low elevation ecological landtypes of LTA Bd03 (DeMeo, 1998) have been surveyed for this species. Also, all proposed project areas across the MNF have been surveyed for this species before a project is implemented. No new sites have been found.

### **Education and Training**

- The MNF has produced a book with color photos of threatened and endangered plant species on the MNF. This book was provided as reference material to appropriate Forest Staff.
- Forest staff is involved in forest management issues relating to threatened and endangered plants.
- Selected personnel have been trained to identify and survey for this species.
- The MNF keeps abreast of current research on this species.

### **Research**

- The MNF provides opportunities (in cooperation with the WVDNR) for university students to conduct research when requests are received.

### **Land Acquisition**

- The MNF looks for opportunities to purchase land that will protect this species.

## **VIRGINIA SPIRAEA**

<i>Spiraea virginiana</i>	Threatened
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VA spiraea occurs along stream banks of high-gradient second- and third-order stream reaches, or on meander scrolls, point bars, natural levees, and other lower-reach braid features near the stream mouth (USFWS 1992(b)). The single MNF VA spiraea site exemplifies ideal VA spiraea disturbance-adapted shrub habitat (USFWS 1992(b)). About 100-150 stream miles of potential VA spiraea habitat exist within potential project areas. No designated critical habitat for this species exists on the MNF.

### **Consultation and Cooperation**

- Management and implementation of this species' Recovery Plan is coordinated with WVDNR, universities, Forest Service research, USFWS, The Nature Conservancy, etc. For example, the MNF participates with WVDNR in annual monitoring of the VA spiraea.

### **Habitat Protection and Improvement and Protection of Individuals**

This species is restricted to riparian topography where tree competition is inhibited by erosion. It generally is associated with riparian vegetation including, but not restricted to eastern hemlock, sedges, rhododendron, and Carolina tassel-rue, in third-order streams at elevations above 2600 ft where it is not overtopped by arboreal or fast growing herbaceous species.

### **Protection of Occupied Habitat**

- Known populations, including an appropriate buffer around each population, are avoided.

### **Protection or Development of Suitable Habitat**

- Potential project areas are surveyed for this species' habitat and adverse effects are avoided.
- Riparian protection, natural large wood recruitment for habitat restoration and maintenance, and watershed health are emphasized on the MNF (USFS, 2001, pp. 18-19). Such efforts help conserve potential VA spiraea habitat and encourages dispersal along streams.
- No active management is implemented within known populations of this species. If inventory results indicate that populations are declining and need some type of active management, then the USFWS, WVDNR, and current research would be consulted on appropriate measures to take.

### **Monitoring/Inventory/Survey**

- About 60 miles of streams within 70,000 acres of project areas have been surveyed for this species.
- MNF VA spiraea populations are monitored annually by the WVDNR.

### **Education and Training**

- Personnel have been trained to identify and survey for this species.
- The MNF has produced a book with color photos of threatened and endangered plant species on the MNF. This book was provided to Forest Staff who might need it.

### **Research**

- The MNF provides opportunities (in cooperation with the WVDNR) for university students to conduct research when requests are received.

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